FREE LABOR IN BRITISH GUIANA AND BARBADOES.

[First Article.]

PHYSICAL GEOGRAPHY OF BRITISH GUIANA.

Of the British West India colonies, the scene of the experiment of the substitution of Free for Slave Labor in the production of sugar, British Guiana and Barbadoes take the lead, both in the amount and value of their crops, and, if we except Jamaica, in the number of their inhabitants.

The circumstances under which this Free-Labor experiment has been tried in these two colonies have been exceedingly different. Barbadoes has a narrow territory and a very dense population, while British Guiana has a population altogether inadequate to the extent of its territory. There are also very striking diversities in the soil and climate of the two colonies, and indeed in the whole system according to which the cultivation is carried on.

We propose in a series of articles (based upon information obtained and observations made during a recent visit thither), to furnish the readers of THE TRIBUNE with an account of the progress of this experiment thus far in these two colonies, including an account of the colonies themselves, and of their present condition as Free communities contrasted with their former condition.

British Guiana is the least generally known of all the British possessions in America. Even in the British House of Commons, it is frequently spoken of as an island, whereas, it is a part of the main land of South America. As its inhabited and cultivated portion is of a very peculiar character, in a physical point of view, whereby its agricultural operations and its social system generally, are essentially modified, we shall devote this article to a description of the colony, considered in that aspect.

The name of Guiana was early bestowed upon that portion of South America, eight or nine hundred thousand, or perhaps a million square miles in extent, washed on the north-east by the Atlantic Ocean, and separated from the rest of the continent on the south by the river Amazon and its tributary the Rio Negro, and on the north and west by the Orinoco. Between the Orinoco and the Rio Negro, the Cassiquiare, a broad and deep stream, forms a natural water communication, thus in fact, insulating Guiana from the rest of the South American Continent.

The north-western portion of this extensive region, bordering on the Orinoco, and known to geographers as *Spanish Guiana*, belongs to the Republic of Venezuela. The south-eastern and southern portion, washed by the Amazon and Rio Negro, and known as *Portuguese Guiana*, forms a part of the Empire of Brazil. These two divisions embrace, territorially speaking, by far the larger portion of the entire region known as Guiana. Intermediate between them, and along the Atlantic coast, lie the colonies belonging to the French, Dutch, and English, known respectively as *French Guiana*, or Cayenne, *Dutch Guiana*, or Surinam, and *British Guiana*. This latter appellation is, however, of quite recent origin. It was first brought into use, at least officially, so late as 1831, when that name was given to a newly-constituted Government formed by the union under one administration of the territory formerly belonging to two separate colonies, known respectively as Demerara and Essequibo, and Berbice.

The colony of British Guiana, as thus constituted, extends along the coast of the Atlantic from the River Corentyn, by which it is separated from Dutch Guiana, and which flows into the Atlantic in six degrees of north latitude and fifty-seven degrees of west longitude, to the mouth of the Pomeroon in seven degrees and a half of north latitude and fifty-nine degrees of west longitude—a distance, following the indentation of the coast, of some two hundred miles. This at least is as far west as the present settlements extend, or as any permanent lodgement has ever been made, though a claim has been put forward to extend the British territory along the coast almost or quite to the southern embouchure of the Orinoco, on the strength of some old Dutch settlements, those of *New-Zealand* and *New-Middleburg*, which still figure on maps and charts, though they have hardly had any other existence for two hundred years past. For it is to be observed that what is now British Guiana was originally a Dutch possession, the colonies of Berbice and of Essequibo and Demerara having been originally established by Dutch merchants and planters, and having only passed into the hands of the British, as will be shown more fully hereafter, towards the close of the last century, pending the French revolutionary war, and not definitively until the peace of 1815. At the same time it may be noticed as a curious coincidence that the portion of Guiana still remaining in the hands of the Dutch and known as Surinam was originally settled by English planters, having been yielded up to the Dutch as a sort of offset for the seizure by the English of the Dutch North American settlement of New Netherland.

The interior boundary which separates British Guiana on the west and north from Venezuela, and on the south from Brazil, is as yet entirely unsettled. According to a claim which has been set up by the English—based partly on former Dutch explorations and occupations, and partly on theoretical ideas—to go back, at least in a southern direction, to the heads of the rivers which flow into the Atlantic within the admitted territory of British Guiana, that province would obtain an extent of not less than 74,000 square miles, which would give it a territory exceeding that of the State of Virginia. According to the ideas of the Venezuelans and Brazilians, it would be curtailed within the limits of some 12,000 miles, not much larger than the State of Vermont; though even this extent would still leave it, if the smallest in area, in population and products, by far the most important of all the Guianas, and in point of territory much the largest of all the British American tropical colonies.

This boundary controversy is, however, for the present, at least, of very little consequence, though the recent discovery of gold diggings not far from the southern bank of the Orinoco did threaten to raise some question with the Venezuelans. But the poorness of the diggings and the hardships experienced by some of the colonists who undertook to visit and explore them, speedily put a stop to the gold fever, and fortunately for the planters, to any disposition to emigrate in that direction.

Even of the 12,000 square miles as to which the British title is undisputed, by far the larger part is and always has been, so far as human occupancy is concerned, in the exclusive possession of two or three thousand scattered and wandering Indians. The portion possessed and cultivated or otherwise put to use by the white and black inhabitants has always been restricted to the immediate banks of the rivers and the coast of the sea. The early settlements were made at a considerable distance up the rivers; but it is in close vicinity to the sea that the sugar plantations which constitute the wealth of the colony are exclusively situated, extending nowhere at present to a greater distance from it than a few miles up the rivers.

As the coast of British Guiana begins to be approached the waters of the ocean take on a peculiar appearance. At the distance of more than a hundred miles from the land they lose their deep blue color and assume a dark green hue. This dark green gradually changes to a pale green, and by the time the soundings are obtained, which happens long before the land is visible, the water has become of a whitish color, in which the green tint is but slightly perceptible. The water gradually shoals from twenty to five fathoms, when, if the weather is clear, a low line of coast becomes visible, distant ten or twelve miles. It is lined with a skirting of bush, to use the language of the colony—principally the mangrove and the courida (*Avicenna nitida*) trees, which rejoice in the salt water. Behind may occasionally be seen towering a gigantic silk cotton tree, or a row of tall cabbage palms, indicative of a plantation. As the coast is approached nearer—though vessels of considerable draft ought to keep a good distance—the smoking chimneys of the sugar works occasionally appear. By this time the waters of the ocean have totally lost the blue and green which we are accustomed to associate with them, and, so far at least as color is concerned, have taken on the aspect of a vast mud puddle. This discoloration of the waters of the ocean, a distinguishing characteristic of the whole coast of Guiana, is doubtless occasioned by the vast quantities of sand and mud which the copious waters of the Amazon and its numerous tributaries, under the influence of the rains almost continuous in that climate, sweep down from the slopes of the Andes and the mountains of Brazil. This immense accumulation of muddy waters is precipitated in so vast a torrent into the ocean as to freshen as well as to discolor its waters for more than a hundred miles seaward. Under the constant pressure of the trade winds, and the current westward which they occasion, this turbid flood sets along the coast northward and westward, contributing also by its own supplies to accelerate the current by which that coast is thus constantly swept. It is, doubtless, from deposits derived from this source that the whole alluvial sea coast border of British Guiana, including all the land at present in cultivation, has in the course of countless ages been gradually formed. This alluvial coast district, from a depth inland at the western limit of the colony of only two or three miles, gradually widens to the eastward, till on the river Corentyn, which separates British from Dutch Guiana, it is said to have a depth of some forty miles. Its inland boundary is a range of low barren hills, which traverses the whole colony from north-west to south-east, principally composed of sand of various shades of color, from pure white to black, and which evidently appear to have once formed the boundary of the ocean in that direction.

It would seem that this alluvial district of British Guiana, as well as that of Dutch Guiana, its eastern neighbor, was originally covered by the sea forming a bay or indentation in the coast, of which the line of sand-hills appear to have been the shore. In this bay the turbid waters had liberty to spread themselves, out of the immediate influence of the current, and to deposit those successive layers of sand, clay, and mud, of which, as appears from the strata passed through in boring for artesian wells, this alluvial district is composed for a depth of at least two hundred feet. Nor indeed has the bottom on which it rests ever yet been reached.

Though in the particular order and respective thickness of the strata penetrated by these borings there is a considerable variation, yet there is a substantial agreement in their general character. The water is found in strata of pure white sand, mixed with small pebbles of quartz. These strata are sometimes reached at the depth of fifty feet, though the average depth of the wells is nearer a hundred and fifty feet. The surface soil rests sometimes on a layer of sand and mud mixed together, principally the former, known in the colony as "caddy," and sometimes on a stiff clay. But there generally occurs at varying depths below the surface a thick layer of semi-fluid mud, so soft that the auger often goes down several feet of its own mere weight. The actual surface would thus appear to be a hardened crust, of but moderate thickness, resting upon an expanse of semi-fluid mud—a condition of things which will account for the jarring often felt in Georgetown, the capital of the colony, when a carriage passes the house. That such is the fact, seems also to be confirmed by the experience had in building and working the railroad which runs fifteen miles or more from Georgetown, parallel to the sea coast. The embankment on which this road is built, formed of earth thrown out of a trench on each side of it, shows a great disposition to settle, and too heavy a weight placed upon the road will cause the mud to ooze up from the bottom of these side trenches. Further down are found various strata of clay, of which some are so stiff and hard that the auger penetrates them with difficulty. At all depths hitherto reached, decayed wood and leaves are met with.

The water in these wells seldom if ever overflows, and it is necessary to use pumps to raise it above the surface. As it issues from the tubing it is about 84° Farenheit, being five degrees higher than the common temperature of water in that climate at daybreak. Its flow is greatly dependent upon the state of the tide, the water in the tube rising some eighteen inches higher at high water than at low, while at spring tides there is a difference of from two to three feet. It contains a large proportion of iron, suspended by carbonic acid gas, with some soda and magnesia. When issuing from the earth it is pellucid, but, after being exposed to the air for a few hours, it gives off a disagreeable odor, and the iron forms a pellicle on the surface, and afterward settles to the bottom. If it be now filtered it will answer for several domestic purposes, and may even be drank, though not very agreeable to the human palate. Cattle, however, drink it readily in its natural state; and these wells, in time of severe drouth, have proved very useful both in town and country.

The general character of the surface soil is clay in several varieties, sometimes blue and very stiff, fit to make bricks of, sometimes brown or yellow, with an intermixture greater or less, of sand. Occasionally a narrow sand reef will be found running parallel with the coast, and in these sand reefs springs of drinkable water occur, though rarely. These are the only springs to be found in the alluvial district of the colony. The inhabitants depend principally on the rain water, which is collected in large tanks, though on the plantations, the back or bush water, so called—the rain water which accumulates in the rainy season in the undrained and uncultivated tracts behind the plantations—is much used. This water, though greatly discolored by a vegetable infusion, has no objectionable taste, nor however it may be with strangers, does it seem to disagree with those accustomed to its use.

As the land recedes from the sea it becomes covered in many places, sometimes to the depth of several feet, with a light, peaty matter, composed of decayed vegetation, tending to take on a carbonaceous form, and known in the colony as "pegass." The natural growth of the alluvial plain appears to have consisted of a variety of soft wood, not generally of large growth, except now and then a gigantic silk cotton tree. Back of the existing plantations there often occur grassy tracts inundated in the wet season, and known as savannahs, but whether natural meadows or formed by the burning off of the wood in dry seasons, does not appear. Such conflagrations have occasionally occurred during protracted drouths, sweeping for great distances, threatening plantations with destruction, and burning up not only the wood but the pegass covering of the soil.

It is not easy from any explorations or examinations which have yet been made to ascertain the precise extent and still less the precise agricultural capabilities of the alluvial treat above described. From the facts however already mentioned, an approximate estimate may be formed as to its extent. With a sea line of two hundred miles it widens gradually from west to east till from a depth inland of two or three miles, it is alleged to reach on its eastern border a width of near forty miles. But how far it is possible to bring the more inland portion into cultivation, or how far those lands would answer for the production of sugar is more than is yet known. That it would take a vast amount of capital and labor to put them into cultivation, will be sufficiently obvious when we come to describe the process by which the existing plantations have been wrested from the waters, and by which they are kept in a productive condition. These plantations, notwithstanding the apparent sameness of the surface present great diversities among themselves, and the same thing may be noticed even in different parts of the same plantation owing to natural diversity of soil and different facilities for drainage, which as we shall see hereafter, constitutes a capital point in the cultivation of a Guiana plantation.

Of the lands already rescued from the water, only a limited portion is fitted for the production of sugar. The front lands, immediately bordering on the sea, have a strong impregnation of salt, which is very deleterious to the growth and productiveness of the sugar cane. These front lands, which were formerly cultivated in cotton, for which their saltness was a recommendation rather than otherwise, are now abandoned, or used for the pasturage of cattle, while the sugar cultivation has been carried back a distance of two, three, or four miles. In some cases the sugar works and other buildings have been moved along with the cultivation, it being found necessary, from the breaking in of the salt water or the exhaustion of the fields, to substitute new lands for those formerly cultivated. In many other cases this process of removal has carried the cultivation to a very inconvenient distance from the sugar works. On the other hand, according to the opinion of many experienced persons, the lands fitted for the cultivation of sugar do not run back to any great distance from the sea and the banks of the water courses. At the distance of a few miles in the western part of the colony the barren sand hills are reached. Where the alluvial tract is deeper, the pegass soils predominate inland of which the subsoil is often sand or a yellow clay, fit enough for the production of coffee, to which portions of it were formerly applied, but not well adapted to sugar.

Still, the colonists insist that, with an ample supply of labor, they might easily produce half a million of hogsheads of sugar, instead of the fifty thousand to which the present crop is limited; and, when we consider that the land cultivated in sugar does not now, and with all that has at times been said about abandoned plantations, never did exceed fifty thousand acres, the boast is, perhaps, not too extravagant.

Having said thus much about the alluvial and cultivated portion of British Guiana, we must add a few words about the interior region, and the rivers by which the colony is penetrated, and those regions made accessible. These rivers are four in number—the Corentyn, already mentioned as the boundary between British and Dutch Guiana; the Berbice, the Demerara, and the Essequibo. Of these rivers, the Demerara is the smallest, but much the most important, both by reason of the better harbor at its mouth, and of the extent of cultivation, and the number of inhabitants upon its banks and in its immediate vicinity. Like all the rivers on this coast, it has a bar which extends seaward some four miles, with only nine feet of water at half flood, but at high tide the channel along the eastern shore has some nineteen or twenty feet. The river at its mouth is two miles wide, but it soon contracts to a mile, which width it preserves as high up as the ridge of sand hills above mentioned, which cross it about twenty miles from its mouth. Just within the entrance of the river, and on the east bank, lies Georgetown, the capital of the colony—a city of some thirty thousand inhabitants. On the east and west sea coast, and up the banks of the river, extend lines of plantations, the east coast, up which a railroad runs for fifteen miles, being considered the most flourishing part of the colony. The plantations do not extend up the river for a greater distance than twelve miles. Passing above the sand hills, a primitive district is reached, but still comparatively level, the only range of hills encountered not exceeding two hundred feet in hight. This country is well wooded and produces many trees valuable for timber. Square rigged vessels may ascend sixty or seventy miles, and smaller ones as high as the first rapids, a distance from Georgetown in a straight line of about eighty-five miles. So far up the influence of the tide is felt, and so far the banks of the river are frequented by wood-cutters, to obtain supplies of firewood, charcoal and timber both for domestic use, and for exportation. At Saba, some ten miles below the Fall, ledges of granite first make their appearance in the bed and on the bank of this river, and a quarry of it is wrought to furnish stone for use in Georgetown, especially for the construction of a breakwater to protect the town from the encroachments of the sea. Above the Great Fall, about a hundred and thirty miles, in a direct line from Georgetown, the river is scarcely known, except to the Indians who have a carrying place around it. Here it diminishes to a stream of no great depth or breadth which is supposed to have its rise in some mountains or high lands about sixty miles to the southard. The Demerara being closely pressed in its upper course by the Essequibo on the west and the Berbice on the east, has no considerable tributaries, but a large number of small streams known as creeks, flow into it from both sides, and afford facilities to the wood cutters. During the rainy season the water is fresh nearly to the mouth, and even in the dry season, when water is sometimes difficult to be had, vessels may obtain a supply by sending up as high as the sand hills. The water, though clear, has, like the bush water, a vegetable discoloration, but like that, is both palatable and wholesome.

Next to the Demerara in importance, and next to it in size, is the River Berbice, which enters the ocean about fifty miles to the eastward. This river, in the entrance of which is a small island, has a bar six miles across, which affords, however, at spring tides, a depth of sixteen feet. A mile or two up the Berbice receives a considerable tributary from the east, known as the Canjee Creek, and just at the junction of the two streams lies the town of New-Amsterdam, a port of entry, and next to Georgetown, though far inferior to it, the principal place in the Colony. For vessels drawing not more than twelve feet, the Berbice is navigable for upward of a hundred miles, windings included. Vessels of seven feet draft can ascend it for a hundred and sixty miles, to nearly which distance the tide is perceptible. The Canjee may also be navigated by small vessels for a considerable distance. The banks of both rivers above the line of cultivation present a thick forest growth, including many trees very valuable for timber. But at some distance from the river banks these forests are superseded by wide-spread savannahs, undulating, and downs of clay and sand, of some ninety feet elevation above the rivers, and affording good pasturage. The Berbice has a course above the tide about equal to that below. It was in the upper part of this river that Shomburgk discovered, in 1837, the Victoria lily, though it is said to have been previously met with by explorers of the Amazon.

The Corentyn, of which the east bank belongs to the Dutch, as it approaches the sea, spreads out into an estuary ten miles wide. Just at its mouth the Dutch have the harbor and port of Nickarie. The British have on the other side a few scattered sugar plantations but no town. This river may be ascended by small vessels one hundred and sixty miles. Its whole course is not less than four hundred miles in a direct line, as it takes its rise in a range of mountains near the first degree of North latitude.

The Essequibo, which rises in the same group of mountains, is the largest of all the rivers of British Guiana. At its entrance into the ocean it spreads out into an estuary twenty miles wide, filled with long and narrow islands, of which the three outermost are cultivated in sugar. The entrance of the Essequibo is rendered dangerous by many shoals and sand-banks. The best channel hugs the eastern shore, and has a depth varying from twelve to twenty-four feet. The tide ascends this river for only fifty miles, being stopped by a ledge of rocks which form rapids. Six miles below these rapids it receives the waters of the Masseroony and the Cuyuni, two large rivers coming from the north and west, which, having joined each other eight miles before reaching the Essequibo, flow into that river in a stream a mile wide. But the ascent of these rivers, like that of the Essequibo, is soon impeded by rapids. The Essequibo is considerably frequented by wood-cutters, its banks abounding in fine timber. But although, as we shall presently see, it furnished the principal site of the earliest Dutch settlements, whence at a later day sprang the colony on the Demarara, the only existing establishments of any consequence now to be found on its banks are the Indian mission school of Bartica at the entrance of the Masseroony into the Essequibo, and a penal settlement a few miles up the latter river, and some fifty or sixty miles from Georgetown, where the convicts are employed in working a quarry of granite. The present County of Essequibo, which represents the ancient colony of that name, is made up of the settlements on the islands, with a few plantations on the line of the sea coast eastward, but principally of the sea-coast plantations extending westward of the river's mouth, known in the colony as the Arabian Coast by corruption from Caribbean, that district having been formerly inhabited by a tribe of Indians known as Caribs.

THE BISHOPS OF ROME.

ORIGIN OF THEIR TEMPORAL POWER.

Constantine the Great, when inaugurating the new creed, as one of the constitutive elements of the Roman Empire, assigned to each Bishop certain civil, judicial powers in the *curia*, or civil tribunal of his diocese. In all other governmental and administrative relations, the Bishops were absolutely dependent upon the Emperor and his representatives, the prefects, presidents, and other functionaries. This assignation of a certain comparatively limited judicial function was common to all Bishops; the Bishop of Rome had no larger powers in this respect, nor was he less dependent upon the civil or administrative Imperial officers and authorities than any of his compeers. Constantine, as well as his successors, asserted a supremacy over Bishops, Councils, and Patriarchs, even in theological questions. His successors, especially Valentinian and Theodosius I., maintained the judicial function of Bishops, together with the absolute supremacy of the civil power over the hierarchy. In one word, under the Emperors, East and West, neither the Bishop of Rome nor any other Bishop had any civil, temporal power where he resided, or over his diocese. Rome was governed and administered by the *Præfectus Urbi* and other functionaries, and the Bishops of Rome had not even a shadow of temporal power.

The precedence enjoyed by the Bishops of Rome over other bishops and patriarchs at the Council of Nice, and at other ecumenical councils, was conceded to them exclusively by courtesy. This courtesy was paid to the pagan past of the great city, still the center of the then civilized world, and not to any hierarchical succession of St. Peter, since his having been the first Bishop of Rome is a suggestion of a subsequent epoch. All the bishops in the Empire, the Roman bishops included, were elected by the people, and confirmed by the Emperors.

Theodoric, the Great, King of the Ostrogoths, who put an end to the Western Roman Empire in the last decade of the fifth century, ruled Italy and Rome by continuing nearly all the Roman imperial administrative machinery. Only a Gothic count governed Rome instead of a *Prafectus Urbi*, as the King himself resided in Ravenna. From Ravenna Theodoric confirmed the election of Anastasius II. as Bishop of Rome, and afterwards decided this succession in favor of Symmachus against a competitor; and the King convoked the Italian Councils held under this Bishop. The intrigues of the hierarchy of the Roman Senators with Constantinople irritated the good Theodoric, toward the end of his reign, and he punished the guilty, treating the intriguing Bishop as a sovereign treats an unruly subject.

The Eastern Emperors conquered Italy and annihilated the supremacy of the Ostrogoths. Rome was then governed, not by the Bishops, but by the restored *Prafectus Urbi*, who depended upon the Exarch of Ravenna, by whom all the superior functionaries of Rome were appointed—a Duke, a *Magister Militum*, etc. The Bishops elected in Rome, as they were elsewhere, were confirmed by the Emperors in Constantinople, and paid a fee or a tribute for it, as of old.

Such was the condition of the Roman Bishops until the invasion of Italy by the Longobards. In these wars the Exarchs were worsted, the Longobards extended their conquests to Southern Italy, and Rome with its districts and lands, then called a Duchy, was defenseless. Gregory, Bishop of Rome, surnamed the Great (590—604), aroused the spirit of the people, the military, and the commanders. He directed the defense of the menaced remnants of the Roman World throughout Italy and Sicily. He corresponded with Prefects, Generals, and Bishops, inspiring and instructing them for action. He ordered all Priests everywhere to take an active part in the defense of the country against its invaders, and from this time dates the military dispensation and warlike life of Priests and Bishops, thereafter so prominent in the mediæval times.

Gregory the Great is, therefore, the founder of the rule over the City and District of Rome by the Bishops. He is the founder of secular Papacy. But this independence of the temporal power was not yet fully established. Gregory laid the first stone for its foundation, but even he did not enjoy its full development. He recognized the supremacy of the Emperor Mauritius in Constantinople, and Rome was still governed by Imperial functionaries. Gregory mediated and partly concluded a peace with the Longobards, but he acted in the name of the Exarch. The Emperor, dissatisfied with the treaty, superseded the Exarch, and scolded the Bishop, calling him "*fatuus*." It is true that Gregory retorted with respectful dignity, but not as an equal, nor as a temporal sovereign.

The successors of Gregory continued to be dependant upon Constantinople and the Emperors, and Rome had an Imperial and not an Episcopal Government during the whole of the seventh century. Martin, Bishop of Rome, was seized by the orders of the Emperor, put in chains, and taken to Constantinople, where he died in prison. But when Leo, the Isaurian Emperor of Constantinople, published, in 726, his celebrated edict on images, all Italy revolted. Gregory II., Bishop of Rome, took the lead in the revolt, and succeeded in getting into his hands the temporal power in Rome and the surrounding district or duchy, as far as he could wrest it from the Exarch, or overawe the people. And the actual fact, irrigated by blood, became finally a right. The independence of the Bishops was conquered, not by spiritual, but by carnal weapons.

The Longobard Kings claimed to have inherited the supremacy exercised by the Emperors over Italy, over Rome, and over her Bishops. King Luitprand was foremost in these attempts. For self-defense, the Bishops or Popes of Rome fomented disunion and revolts between the King and his powerful vassals, the Dukes of Spoleto and of Benevento. Then—about 740—originated the celebrated policy, which the Roman See has continued and followed to this day, of weakening Italy, by playing one Italian power against another, and, if this did not succeed, invoking foreign intervention. So Gregory III. called Charles Martel into the domestic broils of Italy, in order to preserve his temporal power.

The Carlovingians became the benefactors of the Roman bishops. Zacharia hallowed the usurpation of Pepin, and the grateful usurper repaid the debt by the celebrated donation of a part of the Exarchate to St. Peter and to the Roman people.

Such was the origin and the basis of the political independence of the Bishops of Rome and of their temporal power. Charlemagne, when crowned Emperor, exercised certain imperial rights of supremacy in and over the City of Rome. History records the struggles of the Popes for additional power with the people, with the feudal barons, and with the various Roman or German Emperors, whom the Popes at times invoked against their own subjects, and at times met with temporal arms. Thus Otho the Great emancipated or liberated Bologna from the Papal rule, then claimed by the Popes in virtue of the celebrated donation, precisely as it is claimed now. In the course of centuries the Popes and the Cardinals—formed into a body or college in 769—extended their power over various lands and cities of Italy, by all the means at their command, just as other princes and sovereigns have done all over the world. War, bloodshed, diplomacy, treaties, deception, murder, and poison were used by the Popes and Cardinals with as much skill as by other rulers, and even more. Some of the Italian cities, smarting under the tyranny of their feudal masters, occasionally invoked the aid and recognized the supremacy of the Popes, and again after a time expelled the Papal legates. This was the case centuries ago with Perugia, Bologna, and others. But these events all come within the epoch of the full development and complete activity of the temporal power of the Bishops or Popes of Rome.

GUROWSKI.

ON RIFLED CANNON....II.

The French were, as we said in our preceding paper, the first to introduce rifled cannon into practical warfare. For five or six years past, two officers, Col. Tamisier and Lieut.-Col. (now Col.) Treuille de Beaulieu, had experimentalized on the subject by order of the Government, and the results arrived at were found satisfactory enough to warrant their being made the base of a reorganization of the French artillery immediately before the outbreak of the late Italian war. Without entering upon the history of the experiments, we will at once pass to a description of the system now adopted in the French artillery.

In accordance wth that desire for unity so characteristic of the French, they adopted one caliber only for field artillery (the old French four-pounder bore of 85½ millimetres, or nearly 3½ inches), and one for siege artillery (the old 12-pounder of 120 millimetres, or 4¾ inches). All other guns, except mortars, are to be done away with. The material selected is generally the common gun-metal, but also cast-steel, in some cases. The guns are muzzle-loading, as the French experiments with breech-loaders gave no satisfaction. There are six grooves in each gun, 5 millimetres deep and 16 mm. broad, of a rounded form; the pitch of the rifling appears to be but low, but there are no details known respecting it. The windage on the body of the shot is about ½ to 1 mm; that on the *ailettes* or warts which enter the grooves rather less than 1 mm. The shot is cylindro-ogival, and hollow, weighing about 12 pounds when filled; it has six ailettes, one for every groove, three standing near the point, and three near the base; they are very short—about 15 mm. long. The fuse-hole passes downward from the point, and is closed by a fuse or by a pistol, with a percussion-cap for shot filled with powder, and by an iron screw, when the shot is not to explode; in this latter case it is filled with a mixture of sawdust and sand, so as to give it the same weight as when filled with powder. The length of bore of the gun is 1,385 mm., or 16 times its diameter; the weight of the brass gun is but 237 kilogrammes (518 pounds). To regulate the line of aim by the deviation (lateral deflection) of the shot in the direction of the pitch of the rifling—a deviation common to all projectiles launched from rifled barrels—the right trunnion carries what is called a horizontal tangent-scale. The gun, as well as its carriage, is reported to be of very elegant workmanship, and, from its small size and neatness, to look more like a model than a real engine of war.

Armed with this gun, the French artillery entered upon the Italian campaign, where it indeed astonished the Austrians by its great range, but certainly not by its accuracy of fire. The guns very often, indeed generally, overshot the mark, and were more dangerous to reserves than to first lines—in other words, where they hit better than the common guns, they hit people at whom they were not aimed at all. This is certainly a very questionable advantage, as in nine cases out of ten it implies that the objects at which the guns were aimed were not hit. The Austrian artillery, with as clumsy a material as any in Europe, made a very decent appearance when opposed to them, and came up to close quarters (that is, 500 or 900 yards) with these formidable opponents, unlimbering under their most effective fire. There is no doubt that, great as the superiority of the new French guns is over their old smooth-bored ones, they did not perform anything like what was expected from them. Their extreme practicable range was 4,000 metres (4,400 yards), and undoubtedly it was but an impudent Bonapartist exaggeration when it was said that they could easily hit a single horseman at 3,300 yards.

The reasons for these unsatisfactory performances, in actual war, are very simple. The construction of these guns is utterly imperfect, and if the French adhere to it, in two or three years their artillery will possess the worst materiel in Europe. The first principle in rifled arms is that there must be *no windage*; otherwise the shot, loosely rolling about in the barrel and grooves, will not rotate round its own longitudinal axis, but rotate, in a spiral line of flight, round an imaginary line, the direction of which is determined by the accidental position of the shot when leaving the muzzle, and the spiral rounds will increase in diameter with the distance. Now, the French guns have considerable windage, and cannot do without it so long as the explosion of the charge is relied upon to light the fuse of the shell. This, then, is one circumstance which explains the want of accuracy. The second is the irregularity of the propelling force created by the greater or less escape of gas through windage during the explosion of the charge. The third is the greater elevation, with the same charge, necessitated through this windage; it stands to reason that where no gas at all can escape between shot and bore the same charge propels further than where part of the gas escapes. Now, the French guns appear to require not only a very great charge for rifled guns (one-fifth of the weight of the shot), but also a pretty high elevation. The greater range obtained by rifled bores over smooth ones, even with smaller charges, is chiefly obtained by the absence of windage, and the certainty of having the whole explosive force of the charge applied to the expulsion of the shot. By admitting windage, the French sacrifice part of the propelling force, and have to replace it by increased charges to a limited degree, and by greater elevation beyond that. Now, there is nothing so contrary to accuracy at any distances as great elevation. So long as the line of flight of the shot does not, at its highest point, much exceed the hight of the object aimed at, so long a mistake in estimating the distance is of little importance; but at long range, the shot takes a very high flight, and comes down at an angle on an average twice as great as that under which it began its flight (this, of course, is confined to elevation up to about 15 degrees). Thus, the higher the elevation the more the line in which the shot strikes the ground approaches the vertical; and an error in estimating the distance of not more than ten or twenty yards may preclude the possibility of hitting at all. At ranges beyond even 400 or 500 yards, such errors are unavoidable, and the consequence is the astonishing difference between the capital shooting on the practice-ground, with measured distances, and the execrable practice on the battle-field, where the distances are unknown, the objects moving, and the moments for reflection very short. Thus, with the new rifles, the chance of hitting beyond three hundred yards on the battle-field is very small, while under three hundred yards, from the low flight of the ball, it is very great; in consequence of which, the charge with the bayonet becomes the most effective means of dislodging an enemy, as soon as the attacking body has come up to that distance. Suppose one army to carry rifles which at 400 yards give no higher trajectory than the rifles of their opponents give at 300 yards, the former will have the advantage of beginning an effective fire at 100 yards greater distance, and as but three or four minutes are required to charge through 400 yards, this advantage is not a mean one in the decisive moment of a battle. It is similar with cannon. Sir Howard Douglas, ten years ago, declared that gun far the best which gives the greatest range with the least elevation. With rifled cannon the importance of this point is still greater, as the chance of error in estimating distance increases with the longer range, and as the ricochets of any other than spherical shot cannot be relied upon. This is one of the disadvantages of rifled guns; they must hit with the first impact, if they are to hit at all, while round-shot, if it falls short, will rebound and continue its flight in very nearly its original direction. Here, then, a low trajectory is of the very highest importance, as every degree more of elevation reduces the chance of hitting with the first impact in an increasing ratio, and therefore the high line of flight produced by the French guns is one of their most serious defects.

But the whole of the deficiencies of these guns are crowned and enhanced by one defect, which suffices to stamp the whole system. They are produced by the machinery and on the principles formerly serving for the manufacture of the old smooth-bored guns. With the very great windage of these old guns, and the varying weights and diameters of the shot, mathematical precision in the manufacture was but a secondary consideration. The manufacture of firearms, up to a very few years ago, was the most backward branch of modern industry. There was far too much hand labor and far too little machinery. For the old smooth-bore arms this might be allowable; but when arms were to be manufactured which were expected to have great precision at long distances, this system became intolerable. To insure the certainty that every musket should shoot perfectly alike at 600, 800, 1,000 yards, and every cannon at 2,000, 4,000, 6,000 yards, it became necessary that every part of